

PHILIP MORRIS  
U.S.A.  
INTER-OFFICE CORRESPONDENCE  
RICHMOND, VIRGINIA

To: • DR. T. S. OSDENE  
From: • D. A. LOWITZ  
Subject: •

Date: JANUARY 2, 1973

PROGRAMS AND OBJECTIVES OF THE  
PHYSICAL RESEARCH DIVISION  
FOR 1973

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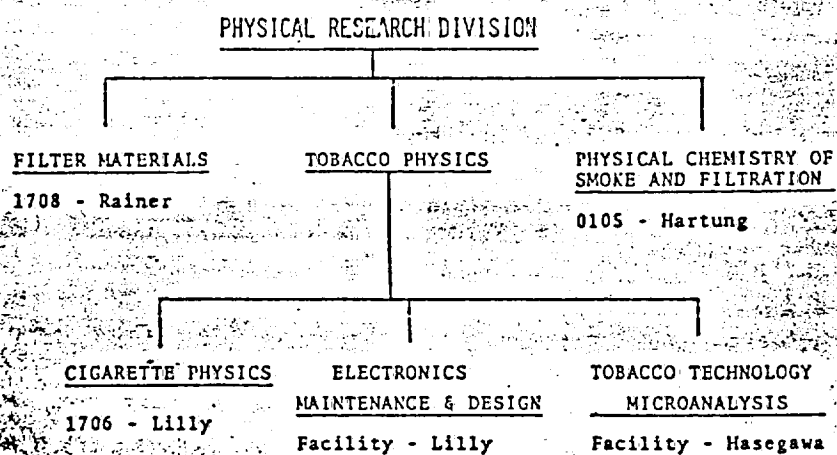
cc: Dr. H. R. Wakeham  
Mr. E. E. Resnik  
Mr. P. A. Graham  
Mr. R. N. Thomson  
Mr. E. Burns  
Mr. L. L. Paylor  
Dr. F. A. Lichorn  
Dr. W. F. Gannon  
Mr. R. J. Kosakowski  
Mr. L. H. Meyer  
Mr. E. Matter  
Mr. J. S. Osmaler  
Dr. F. Will, III

1001514915

3. Microtome and ion machining for thin section preparation

coating for scanning electron microscopy

Microscopy of • • • • • coating for uniform high conductivity



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\* Presently under P.M. R&D contract  
\*\* Presently under ASR, Staunton, contract. We believe it would be better to have him under R&D contract for 1972.

#### PHYSICAL CHEMISTRY OF SMOKE AND FILTRATION - 0105

Staff of nine

Personnel Training: Physical chemistry, kinetics.

Objective: Determine how filters function adequately so that selective filtration systems can be developed. Establish how cigarette smoke and cigarette rod characteristics are related adequately to permit new cigarette products to be designed prior to their fabrication. Determine basic mechanism for filler expansion. Determine feasibility of expanding filler with water.

#### Program:

- (Goal 3 & 5) 1. Selective filtration
  - a. Gas chromatography + sorption kinetics, filter free-space characterization
  - b. Radiotracer analysis + displacement at filter surface
  - c. Particle size effects + composition variation with particle size
- (Goal 1, 5 & 6) 2. Smoke - rod mathematical relationships + cigarette modelling
- (Goal 1) 3. Smoke flavor and tar fractionation + low tar - normal flavor cigarette
- (Goal 4) 4. Filler expansion - basic mechanics } Improved ET position
- 5. Expansion of filler with water } and production upscaling

Items (4) and (5) are covered by one Research Professional, full time, plus a technician on loan from the Development Department.

Project Leader: Dr. H. A. Hartung, Senior Professional  
Mr. J. F. Bobbs, Assistant Professional  
Dr. J. C. Crump, Research Professional  
Dr. S. Debrand, Research Professional  
Mr. R. W. Dwyer, Assistant Professional  
Mrs. Ruth Hale, Technician  
Mr. J. S. Osborne, Research Professional  
Mr. D. L. Simpson, Research Professional  
Mr. L. L. Stewart, Associate Professional  
Dr. D. T. Sawyer, Consultant - \$500  
Dr. J. C. Schug, Consultant - \$500

#### Goals:

- 1. 10 mg Marlboro
- 2. Menthol
- 3. Selective filtration
- 4. Cost reduction
- 5. New products
- 6. Selective delivery by rod

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FILTER MATERIALS - 1708

Staff of six

Personnel Training: Polymer chemistry, surface chemistry and surface physical chemistry

Objective: Search out new materials for filter systems and new methods for treating rod to remove less desirable elements from smoke, to add flavor and aroma to smoke, and to reduce the processing costs for cigarette production.

Program:

- (Goal 1) 1. Copper amine complex (Stoichiometric) → HCN removal
- (Goal 1) 2. Cobalt/alumina (Catalytic) → CO removal
- (Goal 1) 3. Permanganate/alumina (Stoichiometric) → NO<sub>x</sub>, HCN, aldehyde removal
- (Goal 1) 4. Chlorite/alumina (Stoichiometric) → NO<sub>x</sub> removal
- (Goal 2) 5. MP-PVC (also in paper filter as carrier for MP) → TPM Reduction
- (Goal 2) 6. Factice → TPM reduction, CP cigarette
- (Goal 3&5) 7. Systems for controlled release of menthol and other flavors
  - a. grafting to cellulose
  - b. treatment of cellulose with cryogenic NH<sub>3</sub>
- (Goal 2&4) 8. Carbon fiber filler in rod → reduced delivery and cost reduction
- (Goal 6) 9. Compounds added to filler → CO reduction
- (Goal 6) 10. Chemical modification of smoking materials for improved flavor.

Project Leader: Dr. N. B. Rainer, Senior Professional  
Dr. C. G. Dodd, Associate Principal  
Dr. C. B. Hoelzel, Research Professional  
Dr. A. J. Kassman, Associate Professional  
Mr. D. A. Full, Assistant Professional  
Mr. P. A. Wilson, Specialist  
Plus one professional and one specialist to be recommended for hiring by 1973.  
Plus outside laboratory services - \$3,500.

Goals:

- 1. Selective filtration
- 2. 10 mg Marlboro
- 3. Menthol cigarette
- 4. Processing cost reduction
- 5. New products
- 6. Selective delivery

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- \* Maternity Leave of Absence
- \*\* On Loan to Development for 1801
- \*\*\* Military Leave of Absence
- \*\*\*\* Maternity Leave of Absence Starting November, 1971.

# CIGARETTE PHYSICS - 1706

Staff of seven

Personnel Training: Solid state physics, applied mathematics, thermal physics, experimental physics

- Objective:
1. Develop understanding of how specific species of smoke are generated and compose adequate design equations for the process to generate new products.
  2. Determine how specific filter material candidates function and assist in making them suitable for practical filters.

## Program:

- |   |  |
|---|--|
| <p>(Goal 1, 3 &amp; 4)</p> <p>1. Cigarette design</p> <ul style="list-style-type: none"> <li>a. measurement of relevant rod properties</li> <li>b. compose and solve smoke process equations</li> <li>c. design new products</li> </ul> | <p>[ Reduce concentration of less desirable elements of smoke, also normal flavor-low tar cigarette design ]</p> |
| <p>(Goal 2 &amp; 3) 2. Stability improvement of new filter material candidates</p>  |  |
| <p>(Goal 1 &amp; 3) 3. Characterization of flow through filters under actual smoking conditions - smoker acceptability of filter, and filter design</p>   |  |

Project Leader:

- Mr. A. C. Lilly, Senior Professional
- Mr. E. M. Gentry, Assistant Professional
- Mr. H. V. Lanzillotti, Associate Professional
- Mr. B. C. LaRoy, Research Professional
- Mr. S. L. Thurston, Technician
- Mr. C. O. Tiller, Research Professional
- Mr. A. R. Wayte, Technician
- Dr. J. C. Schug, Consultant - \$700
- Dr. D. T. Sawyer, Consultant - \$500
- Princeton Combustion Group - \$50,000

## Goal:

1. 10 mg. Marlboro-like cigarette
2. Selective filtration
3. New products
4. Selective delivery

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TOBACCO TECHNOLOGY MICROANALYSIS

Staff of six

Personnel Training: Biophysics, microinstrumentation, experimental physics

Objective: Provide R & D with microstructure and microgeometry analytic services

Program:

1. Microgeometry of filters, tobacco, filter materials, biological specimens, paper, etc.
  - a. scanning electron microscopy
  - b. transmission electron microscopy
  - c. optical microscopy
  - d. develop techniques for preceding
2. Microstructure of filter surfaces and filter materials
  - a. microprobe analysis
  - b. photoelectron spectroscopy
  - c. x-ray analysis
  - d. develop new techniques for preceding

Facility Leader: Mr. I. Hasegawa, Senior Professional  
Mr. W. L. Carter, Research Professional  
Mrs. Virginia Johnson, Associate Professional  
Mrs. Laura McCray, Assistant Professional  
Mr. D. L. Petri, Specialist  
Mrs. Marie Smith, Specialist  
General EM Consultants - \$500.00

Applications:

Scanning Electron Microscopy

1. Filtration and filter studies
2. Selective filtration
3. Expanded leaf
4. B. L. studies

Transmission Electron Microscopy

1. Filtration and filter studies
2. Selective filtration (particle size distribution studies)
3. Expanded leaf
4. Biological studies (effect of smoke constituents on yeast cells and other tissue)

Optical Microscopy

1. Filter studies
2. Expanded leaf
3. Trouble-shooting in manufacturing, e.g. studies of mold in tobacco
4. Examination of competitors' products

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Physical Chemistry of Smoke	Programs
Chromatograph for displacement	Description
Constant Temperature & Humidity	Chromatograph for displacement
Tobacco-Water Studies	Chromatograph for displacement
Cigarettes for Extensive	Chromatograph for displacement
Modelling Studies	Chromatograph for displacement
Cigarette Paper Apparatus	Chromatograph for displacement
Mechanical Properties Equipment	Chromatograph for displacement
filling power)	Chromatograph for displacement
KTD Equipment;	Chromatograph for displacement
Langmuir balance;	Chromatograph for displacement
Surface Wetting Angle Equipment	Chromatograph for displacement
Physical Smoking Studies	Chromatograph for displacement
machine & suite of sensors	Chromatograph for displacement
be described in detail	Chromatograph for displacement
by S. Osborne. This material	Chromatograph for displacement
described as an extensive	Chromatograph for displacement
modelling studies.)	Chromatograph for displacement

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# TOBACCO TECHNOLOGY MICROANALYSIS (Con't)

## Applications: (Con't)

### Microprobe Analysis

1. Filtration studies (different composition as a function of particle size) (Analysis of deposition on filter and of filter surface)

### X-Ray Analysis

1. Selective filters (structure of catalysts in filters and selective absorbents)
2. Expanded leaf studies, e.g. ammonium carbonate studies

### ESCA

1. Filtration studies
  - a. Different composition as a function of particle size
  - b. Composition of deposition on filter surface, also question of whether chemisorption is occurring

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ELECTRONICS MAINTENANCE AND DESIGN

Staff of four

Personnel Training: Electronics

Objective: Maintain electronic instrumentation in R & D and design and fabricate new instrumentation as required.

Program:

1. Service equipment on request.
2. Routinely test and recalibrate certain instruments.
3. Develop new designs for instrumentation on request.
4. Learn new electronic techniques when feasible.

Facility Leader: Mr. A. C. Lilly, Senior Professional  
Mr. W. L. Jones, Assistant Professional  
Mr. L. C. Bartlam, Specialist  
Mr. J. A. Ferri, Specialist  
Mr. E. Renick, Specialist

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